



## Delivering Cutting-Edge Remote Condition Monitoring Solutions Across the Rail Industry

Born out of two decades of research at the Birmingham Centre for Railway Research and Education (BCRRE), MoniRail is a pioneering rail technology company bridging the gap between academic innovation and industry needs.

Their mission: to enhance maintenance strategies and improve network reliability through advanced condition monitoring systems.

Using sensors installed on in-service trains, MoniRail provides a non-intrusive method of monitoring track condition and degradation. These sensors collect ride quality data and detect both train- and track-related faults in real time.

### Introducing MoniRail

MoniRail is founded on over 20 years of research into low-cost, vehicle-mounted sensor systems designed to measure track geometry and ride quality. Following the development of an initial prototype – successfully tested on an operational passenger train – MoniRail is now focused on commercialising the technology and its data analytics platform.

The core objective is to deliver a commercially robust solution that continuously monitors both track and train conditions. By detecting and identifying performance issues early, the system empowers train operators and infrastructure managers to make informed decisions about maintenance and investment, reducing downtime and improving safety.

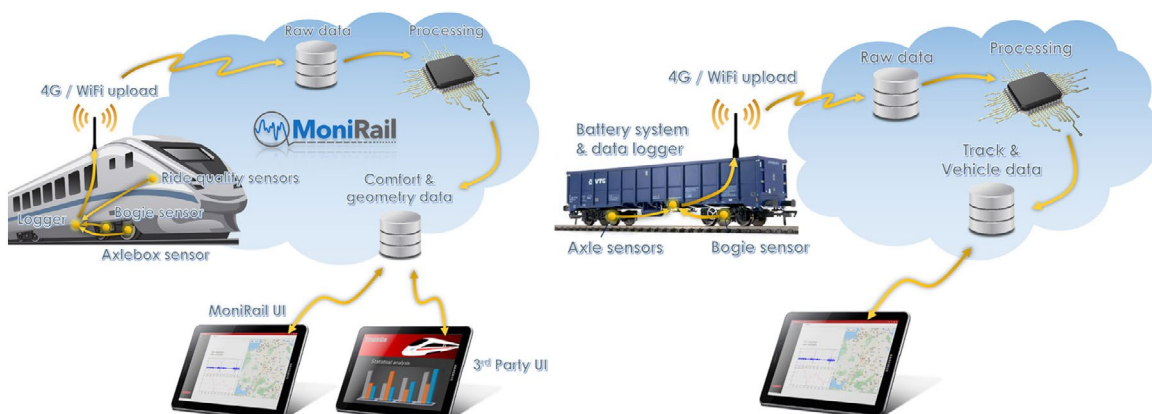
### How the System Works

The MoniRail system collects data via onboard sensors, which is then processed and visualised through its proprietary analytics platform. This transforms raw sensor data into actionable insights, helping customers predict potential failures and better understand the evolving condition of their assets.

With this continuous monitoring and early fault detection capability, MoniRail enables proactive maintenance planning – saving time, reducing costs and minimising disruption.

Since its inception, the MoniRail team has worked to make a meaningful impact on the rail industry through the power of applied research and technology.

Click [here](#) to learn more about MoniRail's work.





# In-service track and ride quality monitoring

Non-intrusive track and train monitoring based on 20 years of academic research from the University of Birmingham, the MoniRail solution harnesses advanced vehicle-mounted sensor technology to deliver insights into track geometry and ride quality, enabling continuous monitoring and predictive maintenance.



## Improves Efficiency

The integrated hardware and software solution supports continual data analysis, helping to improve performance and reduce maintenance costs.



## Fits Fast, Built to Last

Designed for easy installation and low-maintenance, the solution monitors track conditions in real time without disrupting daily operations.



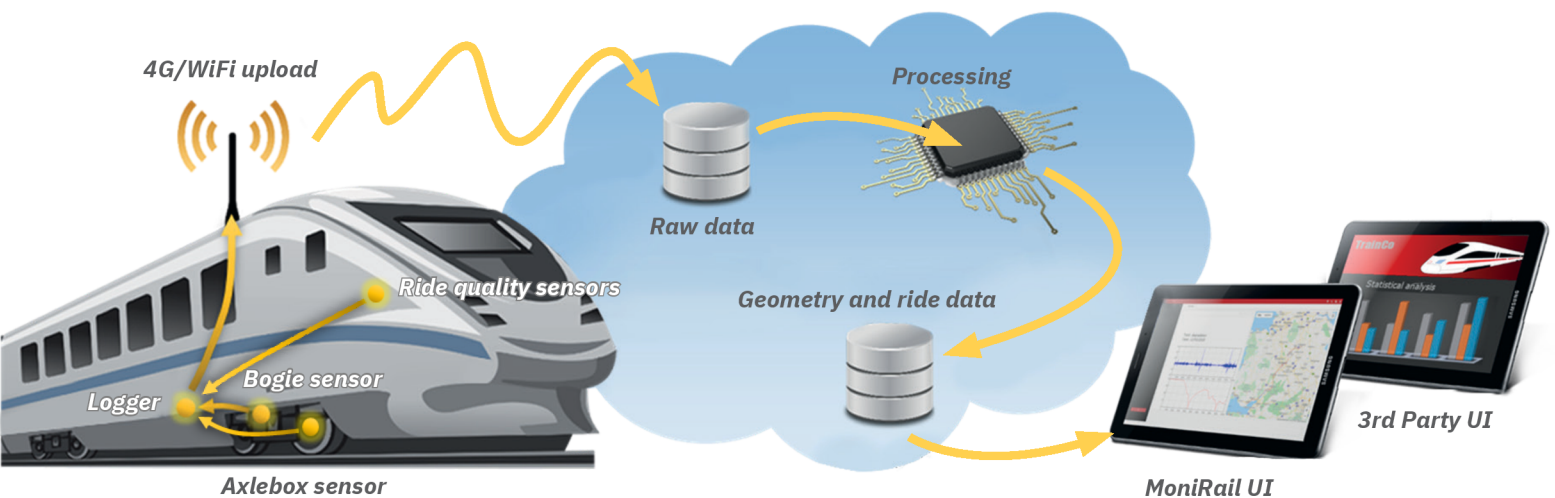
## Real-Time Data

Processed sensor data delivers accurate track condition and vehicle performance data combined with accurate position information.



## Predictive Maintenance

MoniRail empowers railway operators to undertake predictive maintenance, by providing early detection of potential issues. Ensuring the longevity of rail assets and enhancing ride quality.





## The MoniRail system

The MoniRail system consists of two parts: software and hardware. The MoniRail hardware provides a modular solution that includes inertial measurement units on the body, with additional bogie and axlebox vibration sensors to extend the monitoring capabilities depending upon the measurement requirements.

The data from the sensors, combined with an accurate positioning system, is transferred to Azure storage via a 4G connection. Within the cloud, the track and vehicle response data are processed. All data passes through the vehicle body logger system before being transferred to secure cloud storage. The processed data and analyses can then be accessed through a web-based portal that displays track and ride information using a range of parameters.

MoniRail also has access to APIs that allow third-party visualisation platforms to retrieve the data. These datasets can be aligned with data from other track geometry monitoring systems and track recording vehicles. In addition, the system can pinpoint driver-reported rough rides with accuracy to the nearest metre.



Ride quality - rough ride

Pseudo track geometry

Hunting detection

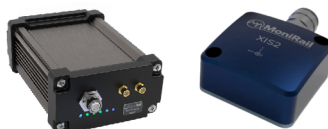
Suspension performance



Sub-metre track/rail issues

Wear and impact

Axlebearing monitoring



Track geometry measurements

Bogie instability checks

Track degradation

Ride quality - rough ride

Pseudo track geometry

Hunting detection

Suspension performance

